

# United States Patent and Trademark Office

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.	
10/707,746	01/08/2004	Jon A. Casey	FIS920030357US1 1745		
32074 7	590 11/21/2005		EXAM	EXAMINER	
INTERNATIONAL BUSINESS MACHINES CORPORATION			NGUYEN, TUAN H		
DEPT. 18G BLDG. 300-48	2		ART UNIT	PAPER NUMBER	
2070 ROUTE 52 HOPEWELL JUNCTION, NY 12533			2813		
			DATE MAILED: 11/21/2005		

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary  - The MAILING DATE of this communication appears on the cover sheet with the correspondence address Period for Reply  A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.  Detendent of time rups be availate under the propistor of 27 FRI 136(pt. in or evert, however, may step be strively filed  1 MO period for reply as specified above. The maintainen statutory period will apply and will expire 3X (6) MONTHS from he maining date of this communication.  1 Propistor for reply as specified above. The maintainen statutory period will apply and will expire 3X (6) MONTHS from he maining date of this communication.  1 Propistor for reply as specified above. The maintainen statutory period will apply and will expire 3X (6) MONTHS from he maining date of this communication.  1 Propistor for reply as specified above. The maintainen statutory period will apply and will expire 3X (6) MONTHS from he maining date of this communication, which is the communication.  2 Propistor for reply as specified above. The maintainen statutory period will apply and will expire 3X (6) MONTHS from he maining date of this communication, which is the communication.  3 Propistor for reply as specified above. The maintainen statutory period will apply and will apply and will expire 3X (6) MONTHS from he maining date of this communication, which is communication.  3 Propistor for reply as specified above.  3 Propistor for this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Expire 2005.  2 Propistor of Claims  4 Propistor for this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Expired Application for Claims and accordance with the practice under Expired Application Propistory and accordance with the practice under Expired Applica	· ·		Application No.	Applicant(s)				
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WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.  Exencions of time may be available used the provisions of 3 CFR 1.13(a). In no event, however, may a reply be timely filed after CIX (6) MONTHS from the mailing date of this communication. The city of the communication of the communica			ears on the cover sheet with the o	correspondence ad	Idress			
1) ⊠ Responsive to communication(s) filed on 15 September 2005.  2a □ This action is FINAL. 2b □ This action is non-final.  3) □ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11, 453 O.G. 213.  Disposition of Claims  4) ☒ Claim(s) 1-22 is/are pending in the application. 4a) Of the above claim(s) 19-22 is/are withdrawn from consideration.  5) ☒ Claim(s) 1-12 is/are rejected.  7) □ Claim(s) 1-12 is/are rejected.  Application Papers  9) □ The specification is objected to by the Examiner.  10) □ The drawing(s) filed on is/are: a) □ accepted or b) □ objected to by the Examiner.  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  11) □ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.  Priority under 35 U.S.C. § 119  12) □ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  a) □ All b) □ Some * c) □ None of:  1. □ Certified copies of the priority documents have been received in Application No  3. □ Copies of the certified copies of the priority documents have been received in this National Stage application from the international Bureau (PCT Rule 17.2(a)).  * See the attached detailed Office action for a list of the certified copies not received.  Attachment(s)  1) ☑ Notice of Parlsperson's Patent Drawing Review (PTO-948)  3) ☑ Information Disclosure Statement(s) (PTO-1449 or PTO/SB08)  5) □ Notice of Informal Patent Application (PTO-152)  6) □ Other:	WHIC - Exter after - If NO - Failu Any r	CHEVER IS LONGER, FROM THE MAILING DATE in the may be available under the provisions of 37 CFR 1.13 SIX (6) MONTHS from the mailing date of this communication. In period for reply is specified above, the maximum statutory period were to reply within the set or extended period for reply will, by statute reply received by the Office later than three months after the mailing	ATE OF THIS COMMUNICATIO 36(a). In no event, however, may a reply be till will apply and will expire SIX (6) MONTHS from the cause the application to become ABANDONE	N. mely filed the mailing date of this co ED (35 U.S.C. § 133).				
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Priority under 35 U.S.C. § 119  12)	11)		•	•	• •			
12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  a) ☐ All b) ☐ Some * c) ☐ None of:  1. ☐ Certified copies of the priority documents have been received.  2. ☐ Certified copies of the priority documents have been received in Application No  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  * See the attached detailed Office action for a list of the certified copies not received.  Attachment(s)  1) ☑ Notice of References Cited (PTO-892)  2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  3) ☑ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  Paper No(s)/Mail Date 1/8/04.  5) ☐ Notice of Informal Patent Application (PTO-152)  6) ☐ Other:								
a) ☐ All b) ☐ Some * c) ☐ None of:  1. ☐ Certified copies of the priority documents have been received.  2. ☐ Certified copies of the priority documents have been received in Application No  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  * See the attached detailed Office action for a list of the certified copies not received.  Attachment(s)  1) ☒ Notice of References Cited (PTO-892)  2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  Paper No(s)/Mail Date 1/8/04.  5) ☐ Notice of Informal Patent Application (PTO-152)  6) ☐ Other:		<u>-</u>		) (d) == (D)				
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#### **DETAILED ACTION**

#### Election/Restrictions

Applicant's election with traverse of Group II, claims 1-18 in the reply filed on 9/15/05 is acknowledged. The traversal is on the ground(s) that "both Group I and II are one and the same, and they do not fit the criteria for restriction.". This is not found persuasive because for the reason as noted in the Restriction Requirement, the product as claimed can be made by another and materially different process such as salicide could be formed by co-sputtering metal and silicon rather than annealing to react the metal with silicon.

The requirement is still deemed proper and is therefore made FINAL.

### Specification

The following title is suggested:

-- METHOD FOR INTEGRATING THERMISTOR --.

# Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuda et al. in view of Talwar et al..

Application/Control Number: 10/707,746

Art Unit: 2813

Fukuda et al., figs. 1-6 and related text on col. 3-6 disclose the claimed method for integrating thermistor in an integrated circuit (fig. 4 and related text on col. 4) including the step of forming a thermistor 3 of silicide on an isolation region 2 as a part of the process for forming the integrated circuit (fig. 1, col. 3, lines 27-57). Fukuda et al. do not expressly disclose further steps for forming a silicide on a single crystal semiconductor.

With respect to claims 3, 4, see col. 3, lines 27-35, col. 4, lines 29-30, wherein the thermistor is of WSi and the thickness is 100 nm.

With respect to claim 6, see col. 3, lines 48-50 wherein substrate 1 is of silicon and layer 2 is of silicon dioxide.

Talwar et al., in a method for forming silicide region on an integrated circuit as shown in figs. 1A-1L and text on col. 4-9 teaches the process for forming salicide precursor layer 34 over the isolation region 20 and upper layer of single crystal semiconductor region 25 (fig. 1E, col. 6, second paragraph); reacting the salicide precursor layer 34 with the upper layer 25 to form a salicide 40 self-aligned to the upper layer 25; and removing an unreacted portion of the salicide precursor layer 34 (col. 9, second paragraph).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have simultaneously forming salicide regions on both isolation and the single crystal semiconductor layer as suggested by Talwar et al. in Fukuda et al. process of integrating thermistor in an integrated circuit for reducing process steps, time and cost.

Application/Control Number: 10/707,746

Art Unit: 2813

With respect to claims 2, 5, 7-10, both Fukuda et al. and Talwar et al. do not disclose the interlevel dielectric layer and isolation region; however, it would have been obvious to those ordinary skilled in the art to have formed isolation region by either trench isolation, field oxide or oxide layer, and used BPSG as an interlevel dielectric layer since they are well-known process and material in semiconductor processing technology for isolating the semiconductor regions or layers in an integrated circuit.

With respect to claim 12, since Talwar et al. teaches the use of silicide 42 over the isolation region 20 as a local interconnection (fig. 2), it would have been obvious to those skilled in the art at the time the invention was made to use the thermistor as a local interconnection as suggested by Talwar et al. in Fukuda et al. for simplifying the circuit, reducing the process complexity and cost.

## Allowable Subject Matter

Claims 13-18 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: None of the references of record teaches or suggests the claimed method for forming a thermistor including the step of etching the ILD selective to the patterned thermistor material to define openings in the ILD above the first wiring level, the thermistor material serving as a hard-mask during the etching.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hsu, Souma, Oda, Mooney et al., and Patel et al. are cited as of interest.

Art Unit: 2813

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan H. Nguyen whose telephone number is 571-272-1694. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan H. Nguyén Primary Examiner Art Unit 2813